Connect with Me:
LinkedIn : https://www.linkedin.com/in/priya-bagde
GitHub : https://github.com/priya42bagde
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https://youtube.com/channel/UCK1_Op30_pZ1zBs9l3HNyBw (Priya Frontend Vlogz)

useContext:

What is Prop Drilling:

When managing data between parent and child components, React gives us the ability to use something known **as props to pass data down from parent to child**. Props can only flow **in one direction**, from parent components to child components (and further down). **Prop Drilling** is a situation where data is passed **down from a parent component to multiple child components** until it has reached its final destination. Prop Drilling not only **complicates our code** but also **consumes a lot of space** and can sometimes be **the root of re-rendering. To avoid this, the concept of Context API was introduced** in **both class and functional components, but consuming code is messy, so best way to use the useContext**.

When **state changes occur on parent elements**, React **will re-render components that depend on those values.** Using props works well in most cases. However, when **working in large applications with a large number of components in the component tree, props can become hard to maintain since props need to be declared in each and every component in the component tree. Context**, in React, **can help make things easier for us in situations**.

What's context and Context API(Callback hell):

Context is a way **to manage state globally**. Context is particularly useful when dealing with **data that is considered "global" or needs to be accessible by many components** within the application. Context in React provides a way to pass data through a component tree **without the need to prop-drill (i.e., pass props down manually at every level).**

Context API uses Context.Provider and Context.Consumer Components pass down the data but it is very **cumbersome to write the long functional code** to use this Context API and it will create a callback hell. **So useContext hook helps** to make the code **more readable, less verbose and removes the need to introduce Consumer Component**.

Why useContext is Important:

1.Sharing Data Across Components

2.Avoiding Prop Drilling

3.Avoiding callback hell using consumers.

Key Points:

> *One Provider Component can be connected with many Consumer Components.*
>
> *Providers can be nested to override values deeper within the tree.*
>
> *All consumers that are descendants of a Provider will re-render whenever the Provider's value prop changes.*

Common Use Cases for useContext:

1.**User Authentication**: To manage user authentication status and provide user-specific data to components that need it.

2.**Language Localization**: Context is useful for implementing language localization by providing translated strings to components based on the user's language preference.

3.**Theme Customization**: To apply custom themes to an application, allowing users to personalize the appearance of app.

Limitations of useContext:

One of the limitations of useContext is that it **does not have built-in performance optimizations**. When the **value provided by a context provider changes**, all components that **consume the context will re-render, regardless of whether the change is relevant to them**. This can lead to **unnecessary re-renders and negatively impact performance**, especially in large applications with frequent state updates. Developers need to implement their own performance optimizations, such as **using React.memo to prevent unnecessary re-renders of child components**.

Pitfall:

useContext() always **looks for the closest provider above the component that calls it**. It searches upwards and **does not consider providers** in the component **from which you're calling useContext().**

What's useContext:

- **As the name suggests, the useContext hook lets us use the Context without a Consumer.**
- useContext **returns the context value** for the context you passed. **To determine the context value, React searches the component tree and finds the closest context provider above for that particular context.**
- The useContext Hook provides functional components access to the context value for a context object. It:
  1.Takes the context object (i.e., value returned from React.createContext) as the one argument it accepts.
  2.And returns the current context value as given by the nearest context provider.
- A component calling useContext will always re-render when the context value changes**. If re-rendering the component is expensive, you can optimize it by using memoization.**
- **In Class Components, useContext(MyContext) is equivalent to <MyContext.Consumer>.**
- Now compare the two scenarios, one in which we were using Consumer Component to get the data that we were passing using the Provider Component. In the case of the **Consumer Component, we were using render props that were causing a callback hell.**
- But when we are using the useContext hook in place of Consumer Component sharing and receiving of data becomes much **simpler** than it usually was, to begin with, and our code becomes a lot **less messy and complex**.
- The **working of the useContext hook is the same as Consumer Component**. The only difference is in the Consumer component, we have **to create a callback function to capture the value of the prop of the Provider component** and use it in our React application. But in the case of the useContext hook, we no longer have to create that function, we simply **have to pass the context object in the useContext hook which will return a value** that will be equal to **the value we have sent to the context using the value prop of the nearest Provider Component** and save it in a new variable which will be used in our app dynamically.
- When the nearest Provider Component updates, this Hook will trigger a re-render with the latest context value passed to that Provider. **Even if an ancestor uses React.memo or shouldComponentUpdate, a re-render will still happen to start at the component itself using useContext.**

How to use the context: Using the context in React requires 3 simple steps:

1.creating the context, 2.providing the context, and 3.consuming the context.

1.Creating a Context:

To create a context in React, we use **the React.createContext method**. This method **returns a context object** that can be **used to provide and consume values** within the component tree. The createContext() function which **converts the local state and props into global state and props** and **stores them inside a separate container globally** so that any child component can access it without actually passing down the line.

import React, { createContext } from "react";

const Context = createContext();

2.Providing the context:

Context.Provider component is **used to provide the context to its child components, no matter how deep they are.** Again, what's important here is that all the components that'd like later to consume the context **have to be wrapped inside the provider component.**

To set the value of context use the **value** prop available on the **<Context.Provider value={value} />.** This is how we'll provide some initial data. If you want to change the context value, simply update the value prop.

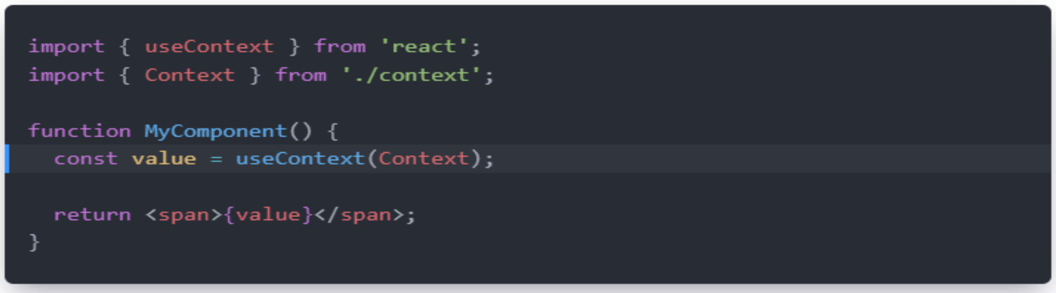
3.Consuming the context:

You can have as many consumers as you want for a single context. If the context value changes (by changing the value prop of the provider <Context.Provider value={value} />), then all consumers are immediately notified and re-rendered.

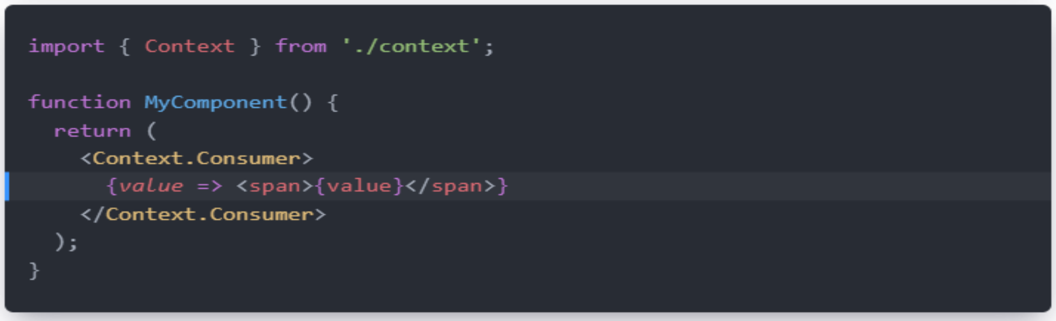
If the consumer isn't wrapped inside the provider, but still tries to access the context value (using useContext(Context) or <Context.Consumer>), then the **value of the context would be the default value** argument supplied to createContext(defaultValue) factory function that had created the context.

Consuming the context can be performed **in 2 ways.**

- The first way, to use the **useContext() hook**, returns the value of the context**: value = useContext(Context)**. The hook also makes sure **to re-render the component** when the **context value changes**.
- The second way, by using a **render function supplied as a child to Context.Consumer** special component available on the context instance.



```
import { useContext } from 'react';
import { Context } from './context';

function MyComponent() {
  const value = useContext(Context);

  return <span>{value}</span>;
}
```



```
import { Context } from './context';

function MyComponent() {
  return (
    <Context.Consumer>
      {value => <span>{value}</span>}
    </Context.Consumer>
  );
}
```

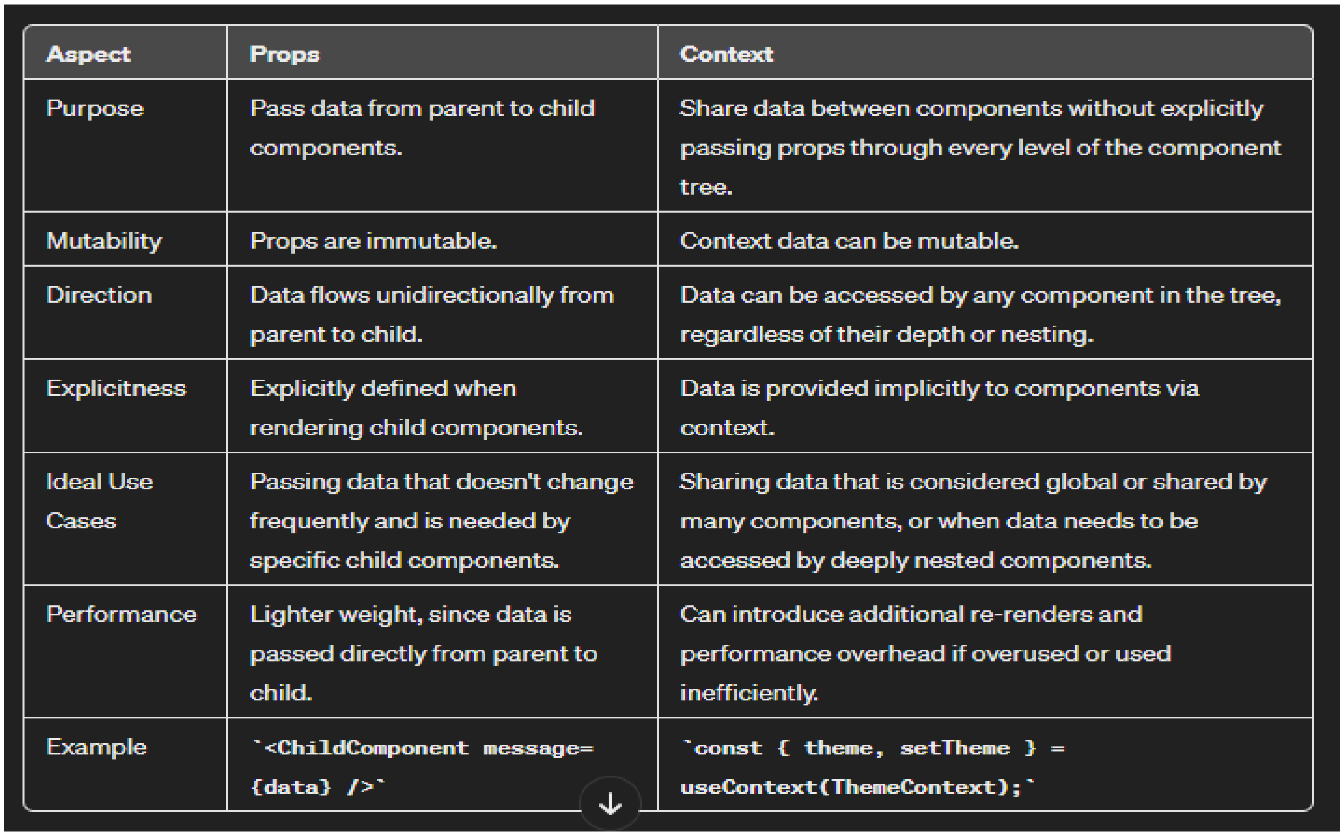
What is context vs useContext?

Context is a feature in React that **allows data to be passed down the component tree without having to pass props explicitly at every level**. It's a way to share data between components that are not in a parent-child relationship. **Context is created using the createContext() method**, **which returns an object with a Provider component and a Consumer component.** On the other hand, useContext is a React Hook that provides a way **to consume data from a Provider component in the context API**. It is a more convenient and efficient way **to access data from the Provider component than using the Consumer component**. By using the useContext Hook, a component can subscribe to changes in the context and access the context value without having to wrap itself in a Consumer component.

What is the difference useContext hook and useState hook?

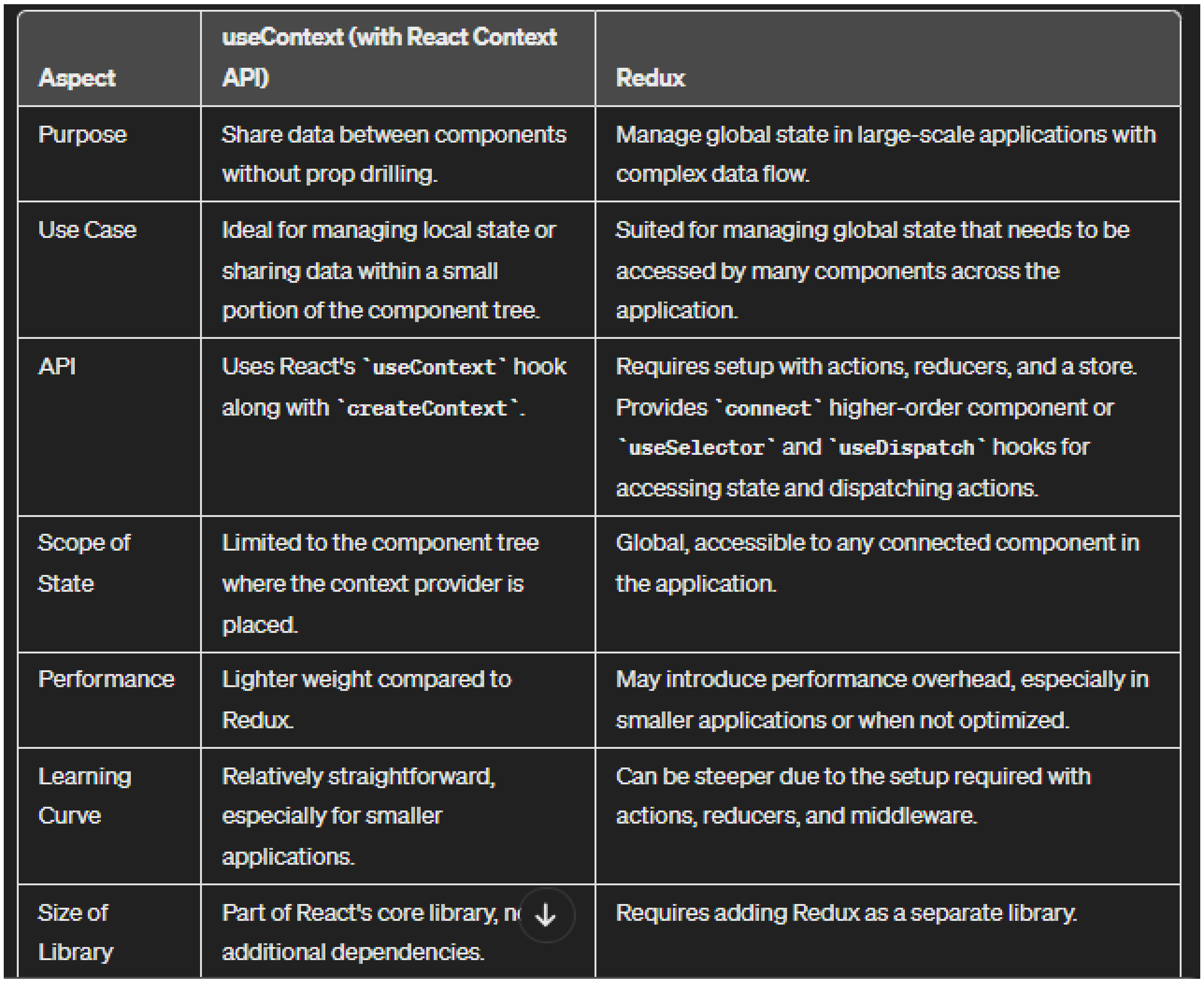
- useContext allows you to **access data that is stored in a global context and pass it down through components**, while useState allows you **to store and manage state within a single component**.
- UseContext is most useful when you **need to access global data**, while useState is best **used within the component.**
- useContext allows you **to keep your global state in one place** and have it **update automatically** whenever that state changes, while useState requires that you **manually update** the state within the component whenever the data changes.

What are the differences between Props and Context:



Aspect	Props	Context
Purpose	Pass data from parent to child components.	Share data between components without explicitly passing props through every level of the component tree.
Mutability	Props are immutable.	Context data can be mutable.
Direction	Data flows unidirectionally from parent to child.	Data can be accessed by any component in the tree, regardless of their depth or nesting.
Explicitness	Explicitly defined when rendering child components.	Data is provided implicitly to components via context.
Ideal Use Cases	Passing data that doesn't change frequently and is needed by specific child components.	Sharing data that is considered global or shared by many components, or when data needs to be accessed by deeply nested components.
Performance	Lighter weight, since data is passed directly from parent to child.	Can introduce additional re-renders and performance overhead if overused or used inefficiently.
Example	`` `<ChildComponent message={data} />` ``	`` `const { theme, setTheme } = useContext(ThemeContext);` ``

What are the differences between useContext and Redux:



Aspect	useContext (with React Context API)	Redux
Purpose	Share data between components without prop drilling.	Manage global state in large-scale applications with complex data flow.
Use Case	Ideal for managing local state or sharing data within a small portion of the component tree.	Suited for managing global state that needs to be accessed by many components across the application.
API	Uses React's `useContext` hook along with `createContext`.	Requires setup with actions, reducers, and a store. Provides `connect` higher-order component or `useSelector` and `useDispatch` hooks for accessing state and dispatching actions.
Scope of State	Limited to the component tree where the context provider is placed.	Global, accessible to any connected component in the application.
Performance	Lighter weight compared to Redux.	May introduce performance overhead, especially in smaller applications or when not optimized.
Learning Curve	Relatively straightforward, especially for smaller applications.	Can be steeper due to the setup required with actions, reducers, and middleware.
Size of Library	Part of React's core library, n additional dependencies.	Requires adding Redux as a separate library.

When to Use Each(useContext/Redux):

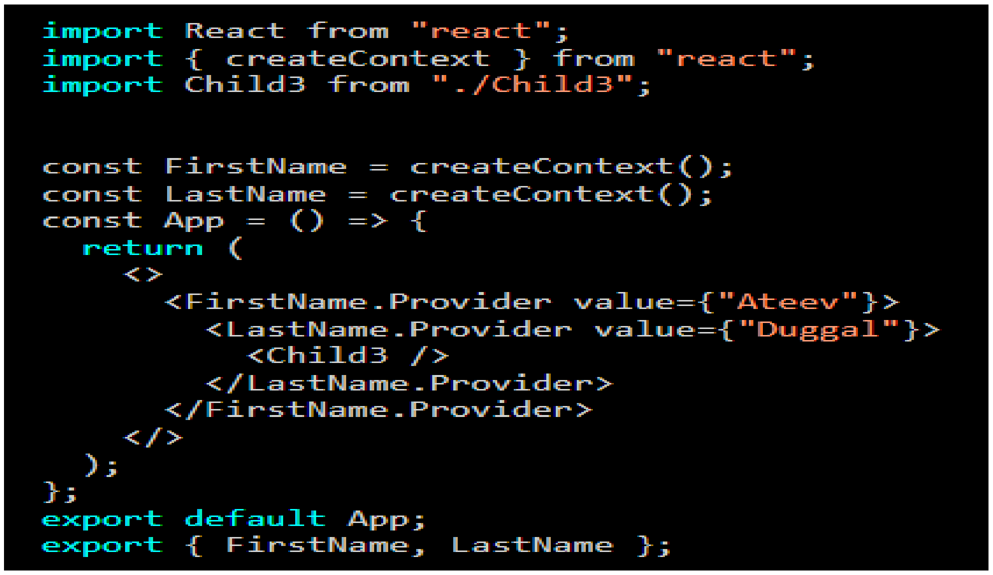
useContext: Consider using useContext **for simple state management** needs or for sharing **state within a specific part of the application**. It is a good choice for **small to medium-sized applications** where state management requirements are straightforward.

Redux: Consider using Redux for **complex state management needs**, especially **in large applications with frequent state updates and interactions**. Redux is also a good choice when you need advanced features like **middleware, time-travel debugging, and a centralized store for global state.**

React Context can also be messy sometimes……………..:

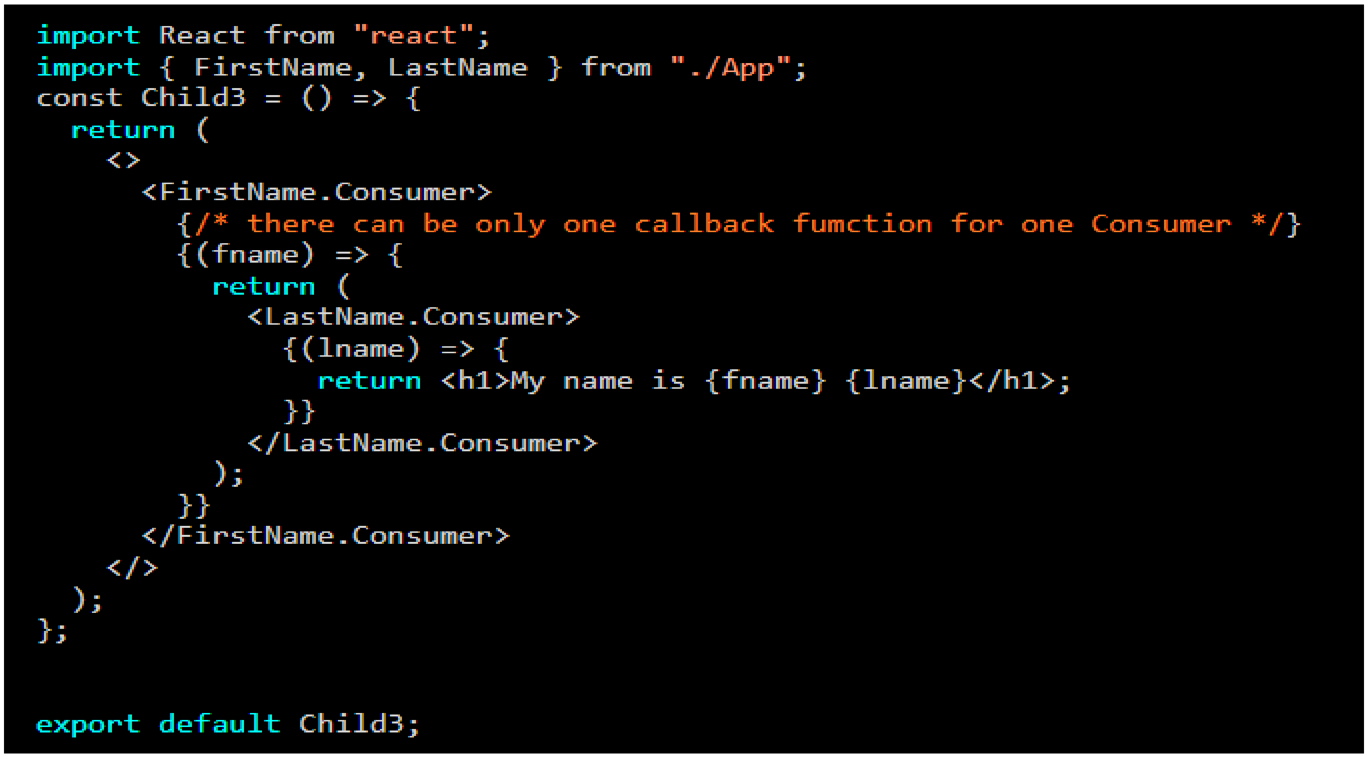
Trying to find the solution for **prop drilling** so that we can make our code **less complex and messy** and for that, we are **using Context API**. **Let's say we have to pass another value irrespective of the previous value or object**. We again have to follow the **same steps as in creating a Context with the help of the createContext() function followed by the Provider Component and Consumer Component.**

Let's understand this concept with the help of the example:



```
import React from "react";
import { createContext } from "react";
import Child3 from "./Child3";


const FirstName = createContext();
const LastName = createContext();
const App = () => {
  return (
    <>
      <FirstName.Provider value={"Ateev"}>
        <LastName.Provider value={"Duggal"}>
          <Child3 />
        </LastName.Provider>
      </FirstName.Provider>
    </>
  );
};
export default App;
export { FirstName, LastName };
```

In the above code, we can clearly see that we have **to create a new Provider Component for every CreateContext() function**. **Until now there is no problem, but the complexity starts from the child component as there can only be one callback function, and for every Provider, we have to create a Consumer, then only we will be able to use that passed value.**



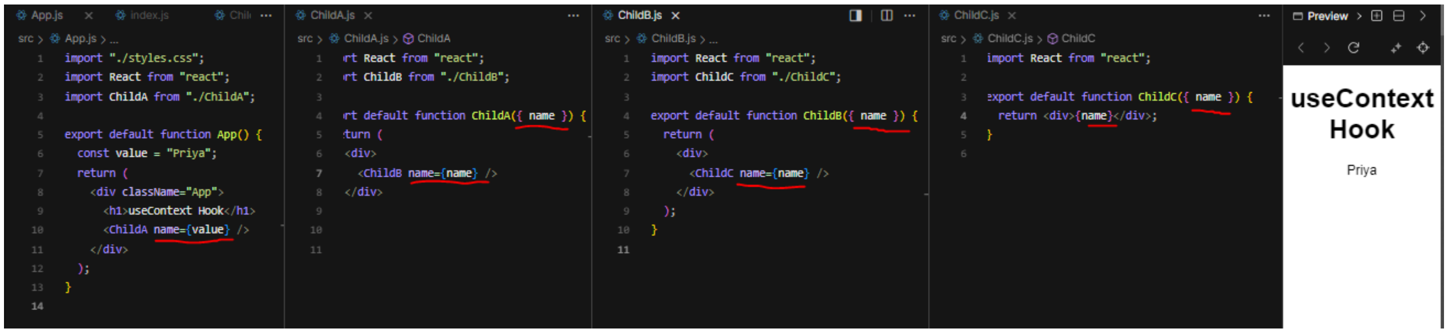
```
import React from "react";
import { FirstName, LastName } from "./App";
const Child3 = () => {
  return (
    <>
      <FirstName.Consumer>
        {/* there can be only one callback fumction for one Consumer */}
        {(fname) => {
          return (
            <LastName.Consumer>
              {(lname) => {
                return <h1>My name is {fname} {lname}</h1>;
              }}
            </LastName.Consumer>
          );
        }}
      </FirstName.Consumer>
    </>
  );
};


export default Child3;
```

It should be obvious from the above code the **level of complexity we will be facing if this goes on and somehow we have to deal with four or five consumers**. It is as complex as it is messy and can be termed the callback hell in programming terms.

Well, React developers have found a way to use all the functionalities of React Context API while **not falling into this callback hell trap**. **That way is to use the useContext hook** which was introduced in React version 16.8 with other hooks.

Example:

Prop Drilling:



App.js

```
import "./styles.css";
import React from "react";
import ChildA from "./ChildA";

export default function App() {
  const value = "Priya";
  return (
    <div className="App">
      <h1>useContext Hook</h1>
      <ChildA name={value} />
    </div>
  );
}
```

ChildA.js

```
rt React from "react";
rt ChildB from "./ChildB";

rt default function ChildA({ name }) {
turn (
<div>
  <ChildB name={name} />
</div>
```

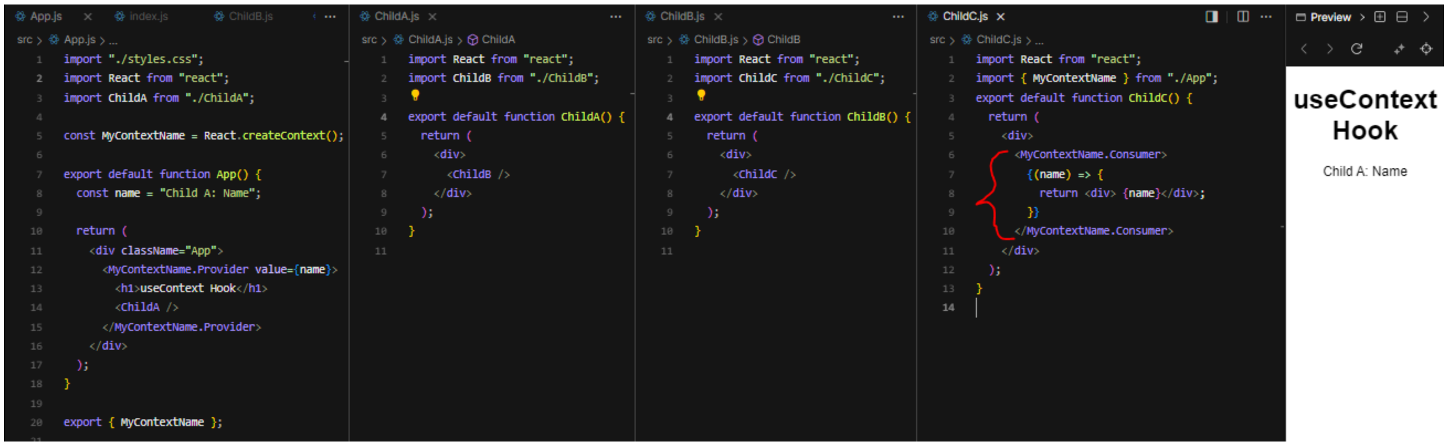
ChildB.js

```
import React from "react";
import ChildC from "./ChildC";

export default function ChildB({ name }) {
  return (
    <div>
      <ChildC name={name} />
    </div>
  );
}
```

ChildC.js

```
import React from "react";

xport default function ChildC({ name }) {
  return <div>{name}</div>;
}
```

Context API with single context:



App.js

```
import "./styles.css";
import React from "react";
import ChildA from "./ChildA";

const MyContextName = React.createContext();

export default function App() {
  const name = "Child A: Name";

  return (
    <div className="App">
      <MyContextName.Provider value={name}>
        <h1>useContext Hook</h1>
        <ChildA />
      </MyContextName.Provider>
    </div>
  );
}

export { MyContextName };
```

ChildA.js

```
import React from "react";
import ChildB from "./ChildB";

export default function ChildA() {
  return (
    <div>
      <ChildB />
    </div>
  );
}
```

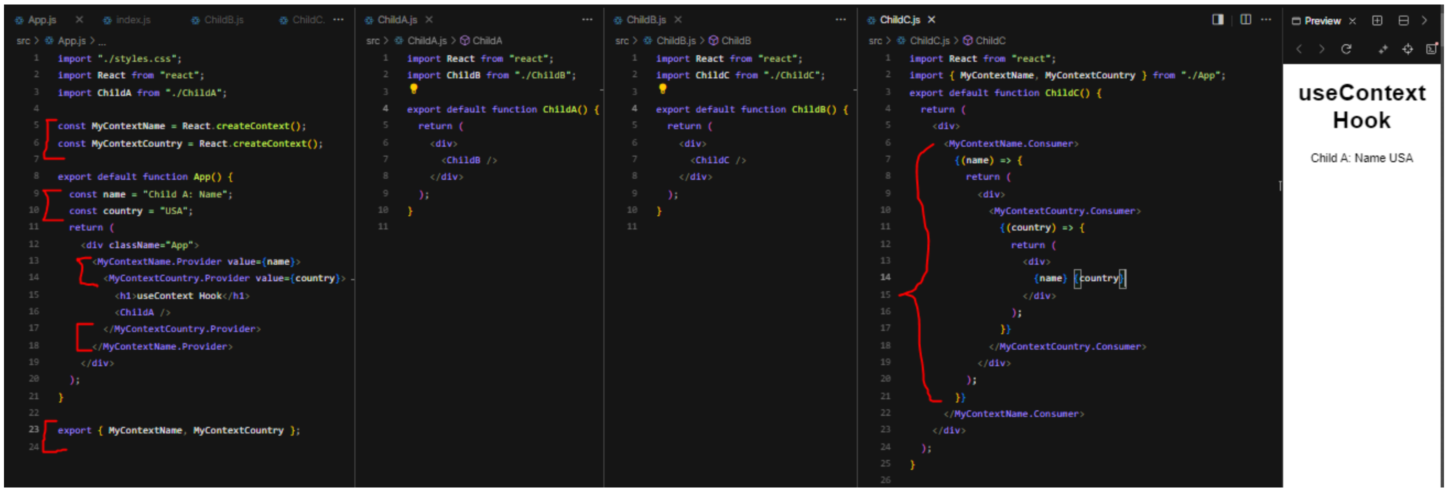
ChildB.js

```
import React from "react";
import ChildC from "./ChildC";

export default function ChildB() {
  return (
    <div>
      <ChildC />
    </div>
  );
}
```

ChildC.js

```
import React from "react";
import { MyContextName } from "./App";
export default function ChildC() {
  return (
    <div>
      <MyContextName.Consumer>
        {(name) => {
          return <div> {name}</div>;
        }}
      </MyContextName.Consumer>
    </div>
  );
}
```

Context API with multiple context(i.e, callback hell):



App.js

```
import "./styles.css";
import React from "react";
import ChildA from "./ChildA";

const MyContextName = React.createContext();
const MyContextCountry = React.createContext();

export default function App() {
  const name = "Child A: Name";
  const country = "USA";
  return (
    <div className="App">
      <MyContextName.Provider value={name}>
        <MyContextCountry.Provider value={country}>
          <h1>useContext Hook</h1>
          <ChildA />
        </MyContextCountry.Provider>
      </MyContextName.Provider>
    </div>
  );
}

export { MyContextName, MyContextCountry };
```

ChildA.js

```
import React from "react";
import ChildB from "./ChildB";

export default function ChildA() {
  return (
    <div>
      <ChildB />
    </div>
  );
}
```

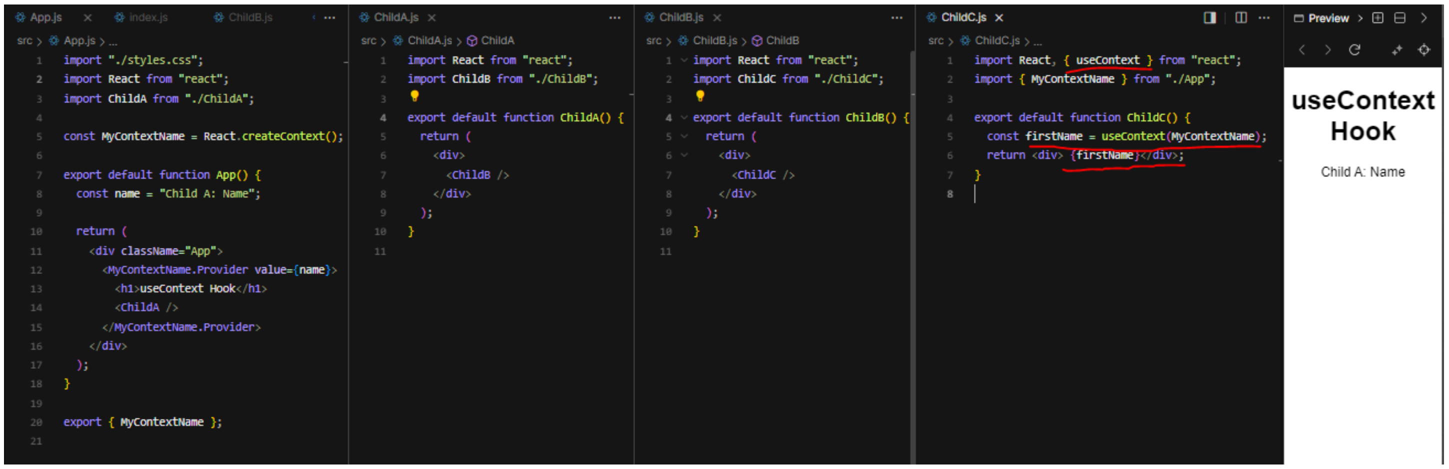
ChildB.js

```
import React from "react";
import ChildC from "./ChildC";

export default function ChildB() {
  return (
    <div>
      <ChildC />
    </div>
  );
}
```

ChildC.js

```
import React from "react";
import { MyContextName, MyContextCountry } from "./App";
export default function ChildC() {
  return (
    <div>
      <MyContextName.Consumer>
        {(name) => {
          return (
            <div>
              <MyContextCountry.Consumer>
                {(country) => {
                  return (
                    <div>
                      {name} {country}
                    </div>
                  );
                }}
              </MyContextCountry.Consumer>
            </div>
          );
        }}
      </MyContextName.Consumer>
    </div>
  );
}
```

useContext implementation:



App.js

```
import "./styles.css";
import React from "react";
import ChildA from "./ChildA";

const MyContextName = React.createContext();

export default function App() {
  const name = "Child A: Name";

  return (
    <div className="App">
      <MyContextName.Provider value={name}>
        <h1>useContext Hook</h1>
        <ChildA />
      </MyContextName.Provider>
    </div>
  );
}

export { MyContextName };
```

ChildA.js

```
import React from "react";
import ChildB from "./ChildB";

export default function ChildA() {
  return (
    <div>
      <ChildB />
    </div>
  );
}
```

ChildB.js

```
import React from "react";
import ChildC from "./ChildC";

export default function ChildB() {
  return (
    <div>
      <ChildC />
    </div>
  );
}
```

ChildC.js

```
import React, { useContext } from "react";
import { MyContextName } from "./App";

export default function ChildC() {
  const firstName = useContext(MyContextName);
  return <div> {firstName}</div>;
}
```